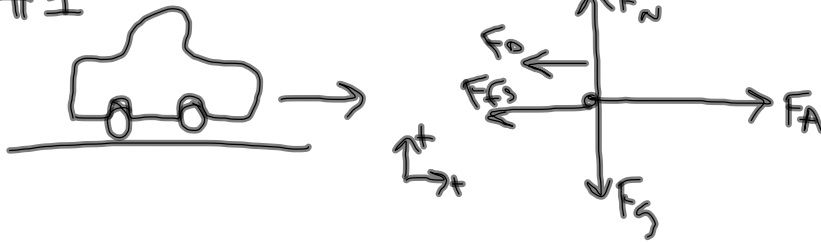


#1:



$$F_{fs} = \mu_s F_N$$

$$\begin{aligned}\mu_s &= \frac{F_{fs}}{F_N} \\ &= \frac{-4952 \text{ N}}{13720 \text{ N}} \\ &= -0.361\end{aligned}$$

$$\Sigma F_x = ma_x$$

$$F_A - F_{fs} - F_D = ma_x$$

$$\begin{aligned}F_{fs} &= F_A - F_D - ma_x \\ &= 1000 \text{ N} - 30 \text{ N} - \\ &\quad (1400 \text{ kg})(4.23 \text{ m/s}^2) \\ &= -4952 \text{ N}\end{aligned}$$

*NOT realistic

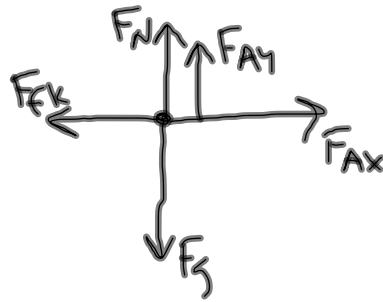
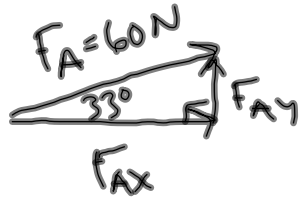
I did a bad job when making up the numbers.

$$\Sigma F_y = 0$$

$$F_N - F_g = 0$$

$$\begin{aligned}F_N &= F_g = ma_g \\ &= (1400 \text{ kg})(9.8 \text{ m/s}^2) \\ &= 13720 \text{ N}\end{aligned}$$

#2:



$$F_{Ax} = F_A \cos(33^\circ) = 50.32 \text{ N}$$

$$F_{Ay} = F_A \sin(33^\circ) = 32.68 \text{ N}$$

$$\Sigma F_x = ma_x$$

$$a_x = \frac{\Sigma F_x}{m} = \frac{F_{Ax} - F_{fk}}{m}$$

$$= \frac{50.32 \text{ N} - 187.4 \text{ N}}{45 \text{ kg}} = -3.05 \text{ m/s}^2$$

* again, not realistic

$$F_{fk} = \mu_k F_N$$

$$= (.425)(441 \text{ N})$$

$$= 187.4 \text{ N}$$

$$\Sigma F_y = 0$$

$$F_N - F_g = 0$$

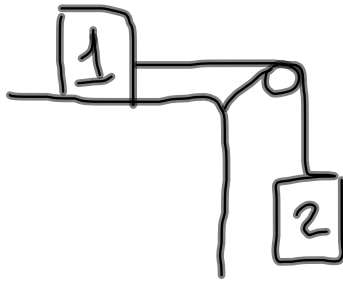
$$F_N = F_g$$

$$= mg$$

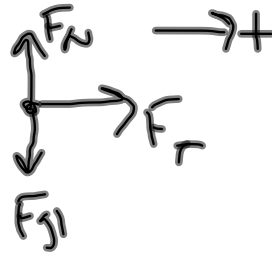
$$= (45 \text{ kg})(9.8 \text{ m/s}^2)$$

$$= 441 \text{ N}$$

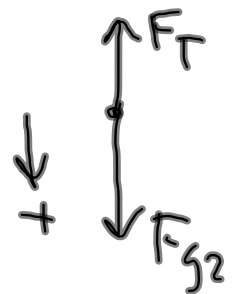
#3:



FBD 1:



FBD 2:



$$\sum F_1 = m_1 a$$

$$\sum F_2 = m_2 a$$

$$F_T = m_1 a$$

$$F_{g2} - F_T = m_2 a$$

$$F_{g2} - m_1 a = m_2 a$$

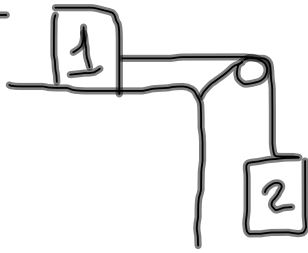
$$m_1 a + m_2 a = m_2 g$$

$$a = \frac{m_2 g}{m_1 + m_2}$$

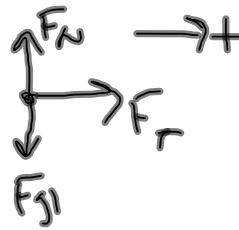
$$= \frac{(5.88 \text{ kg})(9.8 \text{ m/s}^2)}{9.89 \text{ kg} + 5.88 \text{ kg}}$$

$$= 3.65 \text{ m/s}^2$$

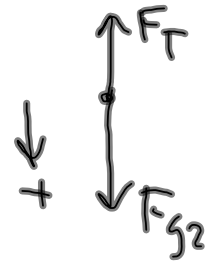
#4:



FBD 1:



FBD 2:



$$\sum F_1 = m_1 a$$

$$\sum F_2 = m_2 a$$

$$F_T = m_1 a$$

$$F_{g2} - F_T = m_2 a$$

$$F_{g2} - m_1 a = m_2 a$$

$$m_1 a + m_2 a = m_2 g$$

$$a = \frac{m_2 g}{m_1 + m_2}$$

$$= \frac{(2 \text{ kg})(9.8 \text{ m/s}^2)}{15 \text{ kg} + 2 \text{ kg}}$$

$$= 1.15 \text{ m/s}^2$$